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(54) Title: INTEGRATED BILL CONSOLIDATION, PAYMENT AGGREGATION, AND SETTLEMENT SYSTEM

Personal Settlements Exchange Flow Overview
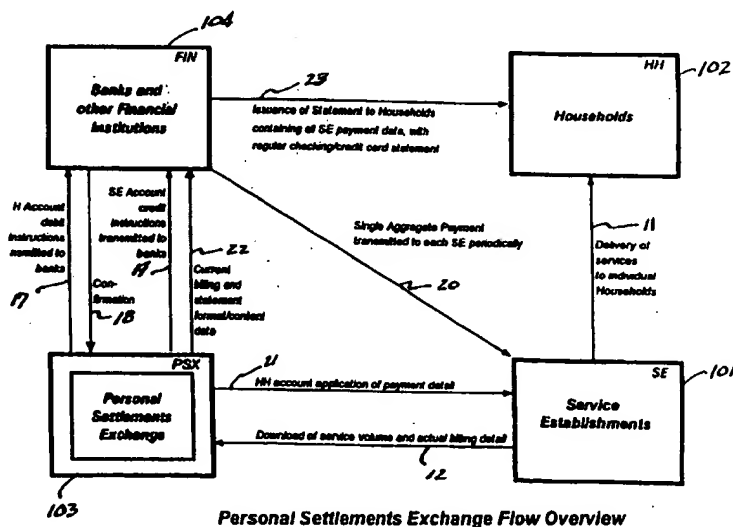
(57) Abstract

The present invention is an integrated bill consolidation, payment aggregation, and account–payment system. The system provides consolidated billing of a plurality of services to a plurality of households (102), the payment to individual service establishments (101) in aggregate "bullet" transfers (verses individual household payments), and the automated application of payments to service establishment accounts (101). The present system computes, stores, and communicates the information needed to direct the financial institution (104) processing of debit and credit transactions between a plurality of service establishments (101) and households (102). The system provides for a number of methods of payment, adjusts for partial and delayed payments, and automatically structures and schedules payments in arrears.

Integrated Bill Consolidation, Payment Aggregation, and Settlement System

TECHNICAL FIELD

This invention relates to automated bill payment which is adaptable to household use.

BACKGROUND ART

Conventional household bill payment is based on the receipt by mail of a paper statement from each service establishment for each billing period. Households issue a multitude of paper checks and associated paper return stubs to these service establishments and the payments are cleared through banks, credited to service establishment bank accounts, and applied or credited to the household accounts on record. In this conventional system, for example, a city of 3 million households, each writing only 5 checks each month will generate more than 60 million paper transactions per month, or 720 million in a year.

Conventional payment systems are designed to handle these inefficient paper payments on a large scale, causing more efficient alternatives to actually increase costs, because they require special "exception" handling. Nevertheless, there has been substantial focus on electronic alternatives to paper checks and stubs. Typically, these electronic alternatives involve automating the consumer interface to enable the creation of electronic transactions, such as, for example, telephone bill-paying, service bureaus, automatic teller machine payment, internet-based home banking, and electronic bill presentment and payment. However, households do not easily adopt new payment systems on a large scale, and receiving service establishments generally resist the associated exception costs. While Internet-based electronic bill presentment and payment may eventually come into widespread use, to date, commercially viable alternate payment technologies have

had a negligible impact on reducing the inefficiencies inherent in conventional paper-based bill payment.

Thus, what is needed is an automated household bill payment system that eliminates paper-based bill payment. The system should be easily adaptable to
5   household use on a large scale. The system further should be low cost to service establishments. The system further should not require electronics or automation at the household point of payment. The system should readily accommodate and directly facilitate the eventual transition to full electronic bill presentment and payment over electronic networks.

10   **DISCLOSURE OF THE INVENTION**

The present invention provides an automated household bill payment system that eliminates 95% of the paper transactions generated in conventional bill-pay processes. The present invention is easily adaptable to household use on a large scale. The present invention further is low cost to service establishments. The
15   present invention achieves these objects without requiring electronics or automation at the household point of payment. The present invention readily accommodates and greatly facilitates the transition to full electronic bill presentment and payment over electronic networks such as the Internet.

A computer-implemented information processing system that acts as a
20   personal settlements exchange for the payment of household bills is provided. The personal settlements exchange encompasses collection and consolidation of household bills into a single periodic statement, aggregation of payments to service establishments, and application of payments to service establishment individual household accounts, all by way of a database management, information processing,
25   and communications system. Banks and service establishments enlist their customer accounts in the personal settlements exchange. Importantly, startup participation need not be at the initiative of the household; enrollment of household accounts is a decision of service establishments and banks.

In a given payment cycle:

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(i)   Service establishments provide the personal settlements exchange with actual service and billing detail by electronic transmission;

(ii)   The personal settlements exchange calculates a consolidated payment or obligation value across all service establishments serving each household. Households agree in advance to pay on a selected date or dates the consolidated amount or an agreed portion thereof;

(iii)   The consolidated payment value, service establishment billing data, and billing statement content and format detail for each household are then electronically downloaded from the personal settlements exchange to each household's selected bank;

(iv)   These banks use the data file to generate a single printed or electronic consolidated household billing statement, which is transmitted to each household by mail (and eventually by electronic means) in lieu of individual statements being compiled, printed, and mailed by each service establishment;

(v)   After the statements have been received by the households, and an agreed amount of time has passed, the personal settlements exchange instructs the banks to electronically debit from or charge to the household bank accounts involved, the consolidated household obligation value or payment amount;

(vi)   The personal settlements exchange then aggregates all of the household payment amounts that are destined for the same service establishment into a single amount and repeats this aggregation for all service establishments. The result is a calculation of the total cash value to be transferred from all households to each individual service establishment, in the form of aggregate bullet payments. The personal settlements exchange instructs the banks to issue these credits to service establishment bank accounts, resulting in the banking system's payment of all household payment obligations for the period. This approach to payment uses only a fraction of the transactions entailed in household-by-household payments to service establishments, and eliminates paper checks from the payment process;

(vii)   Following confirmation of payment execution, the personal settlements exchange issues to each service establishment a detailed verification of the amount and timing of each household's payment. This step provides the information needed

to allocate the aggregate value received by each service establishment to individual households, thus enabling correct application of payment to the appropriate household account number with the service establishment.

The inventive process results in several benefits:

Of the illustrative 60 million transactions per month noted earlier, only 5% or 3 million (the issuance of the consolidated statements) remain under the present system; there are no longer any checks to be written, processed or deposited, and no individual statements from each service establishment to be issued.

The centralized collection of household service establishment information by the personal settlements exchange enables multiple household service establishment billings to be compiled into and presented as a single statement, without the need for direct participation or conscious choice on the part of households. Consequently, consolidated statements can be generated and presented to millions of households without waiting for them to subscribe individually to the service.

Alternate payment methods, whether electronic, debit, charge, or credit can be utilized by choice or offered by default in the present invention, thus creating flexibility for households, utility for service establishments, and functionality for banks.

Since the present invention results in a small number of high-value payments from banks to service establishments, the reliability, simplicity, and cost of actual payment issuance and receipt is dramatically improved.

Because the entire billing and payment-application cycle is managed in the personal settlements exchange system, rather than in the service establishments, these payments do not create exception costs for service establishments.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a block diagram of a payment environment in accordance with the principles of the present invention, showing the data and payment flows.

Figure 2 shows the core computer-implemented processes which work together to create a personal settlements exchange in accordance with the principles of the present invention.

Figure 3 is an exemplary hardware configuration and apparatus for carrying

5   out the information processing, communications, database management, and operational methodology in accordance with the principles of the present invention.

Figure 4A-E is a flow diagram that shows the functioning and methodology in accordance with the principles of the present invention.

Figure 4A.1 shows further detail of figure 4A, and represents a conceptual

10   database model of the present invention showing the relationships among consuming households database, service establishments database, and banks database in the overall context of the personal settlements exchange.

Figure 4A.1-1 shows further detail of figure 4A.1, and highlights the database model structure and views for the consuming households database and the service

15   establishments database to provide a general concept of the data structures underlying the system of the present invention.

Figure 4B.1 shows further detail of figure 4B and is a flow diagram showing the detailed computation of the payment risk factors of the present invention.

Figure 4B.2 shows further detail of figure 4B and is a flow diagram of the

20   actual computation of proforma payments from consuming households to service establishments.

Figure 4C.1 shows further detail of figure 4C and is a flow diagram of the processing of service establishments service and billing data received from each service establishment for the current payment cycle.

25   Figure 4C.1-1 shows further detail of figure 4C.1 and is a representation of the structure of the service establishments data records as downloaded to the personal settlements exchange system from the service establishments, and the content of a single such data record in the service establishment data table.

Figure 4C.2 shows further detail of figure 4C and is a box diagram showing

30   the relationships and tables of rules and codes in the exception management program of the present invention.

Figure 4C.2-1 provides further detail of figure 4C.2 and is a flow diagram of the partial payments processing method of the present invention, reflecting the default handling as well as the instructed management of partial payments.

Figure 4C.2-2 shows further detail of figure 4C.2 and is a flow diagram of the
5   processing of rescheduled payments.

Figure 4D.1 shows further detail of figure 4D and is a flow diagram of the liquidity support and credit enhancement features of the present invention.

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BEST MODE FOR CARRYING OUT THE INVENTION

As an incentive to the adoption of the invention in practice, the preferred embodiment contains features that enable it to take over the entire billing,
15   receivables, and collection process from service establishments, and thus represents the most comprehensive implementation of the inventive process. To accomplish this, the preferred embodiment contains features designed not only to execute the inventive principles, but also to enable it to function effectively as a commercially efficient intermediary between service establishments and financial institutions.
20   These features include, for example, specialized methods of analyzing and managing household receivables and collection risks; methods of calculating risk-adjusted household obligation values; methods of addressing partial, rescheduled, and deferred payments; and methods of enhancing the liquidity and creditworthiness of the settlements exchange in meeting its aggregate payment obligations to service
25   establishments, even in the event of payment shortfalls by households. However, it should be understood that the principles of the present invention equally apply to less comprehensive embodiments of the invention, for example, when serving only as an efficient intermediary for integrated billing, consolidation, aggregation, and settlement services.
30   Referring first to figure 1, an overview block diagram of the major components of the payment environment of the inventive process is seen, showing the data and

payment flows among the components. This is an overview drawing, and several
data flows (such as confirmations and verification transmissions) are not shown, but
are fully described in the accompanying figures. Service establishments (SE) 101
deliver 11 goods and services to households (HH) 102 and download their service
5   volume and billing detail 12 to a personal settlements exchange (PSX) 103. The
personal settlements exchange (PSX) 103 processes this information in several
ways, including calculating a payment for each household (HH) 102 (potentially
adjusted for the risk of slow, partial and default payments) to each service
establishment (SE) 101. This set of payments is consolidated for each household
10   (HH) 102 into a consolidated actual or consolidated proforma payment representing
the total obligation value computed for each household.

With this processing completed, the personal settlements exchange (PSX)
103 issues a set of debit instructions 17 to all financial institutions (FIN) 104,
including banks, from which households (HH) 102 wish to have their payments
15   made. These financial institutions (FIN) 104 receive and store these instructions,
and then debit their individual household members' accounts for the proforma or
actual consolidated payment amount (using electronic debit or credit/charge card
debit) as instructed by the personal settlements exchange (PSX) 103, and issue
payment confirmation 18 to the personal settlements exchange (PSX) 103. The
20   personal settlements exchange (PSX) 103 processes any partial or delayed
payments to maximize its cash collections. The personal settlements exchange
(PSX) 103 then issues to financial institutions (FIN) 104 detailed instructions to
execute the crediting (payment) of service establishment (SE) 101 financial
accounts. These financial institutions (FIN) 104 then issue high-value, aggregated
25   electronic transfers 20 to each service establishment (SE) 101 on behalf of the
households from which they have received payments during that period, in
accordance with the instructions 17, 19 received from the personal settlements
exchange (PSX) 103.

The personal settlements exchange (PSX) 103 may or may not supplement
30   these payments from its own reserves in order to meet payment commitments to
those service establishments (SE) 101 for which the personal settlements exchange

(PSX) 103 takes on full receivables and collection responsibility. The personal
settlements exchange (PSX) 103 then issues 21 to each service establishment (SE)
101 cash application detail to accurately inform the service establishments (SE) 101
which households have paid their bills. Finally, based on the confirmed payments,
5   as well as current period billing information, the personal settlements exchange
(PSX) 103 transmits 22 to each financial institution (FIN) 104 the information needed
to generate the next period's consolidated statement of payments received and
payments due to each service establishment (SE) 101. The financial institutions
(FIN) 104 then issue 23 a consolidated billing statement to households (HH) 102,
10   containing all service establishment (SE) 101 data on payments made, current
billings, service consumption, and next payment date, among other potential items of
information, including advertising and promotional messages that service
establishments may wish to communicate to their household accounts .

Figure 2 shows the computer-implemented core processes which work
15   together to execute the personal settlements exchange (PSX) processes just
described. These processes work in an integrated fashion, and are the foundation of
achieving the invention's object of eliminating paper from the payment process.
There are eight core processes 201 through 208, which perform the central functions
of the inventive process.

20   Functional process 201 is a method of providing the personal settlements
exchange (PSX) with actual billing and service detail from service establishment
(SE) and financial institutions (FIN). This process is invoked during the initial
enrollment of households (HH) by financial institutions (FIN) or by service
establishment (SE), as well as during the periodic updating of the system during
25   each round of payments, for example monthly. In this functional process, the initial
and continuing database of the system is established and complete bank and service
establishment identifying information is entered. Process 201 involves the following
general steps:

(i)   enrolling households (HH) in the personal settlements exchange
30   (PSX);

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(ii)   downloading historical household data from financial institutions (FIN) and other service establishment (SE);

(iii)   creating a matched database of households (HH) and their respective service establishment (SE) and financial institutions (FIN);

5   (iv)   assigning a unique identifying number to each household data file;

(v)   downloading service establishment billing and service data on a continuing basis.

Process 202 is a method of calculating the payment risk factors associated with assuming receivables and collection risk on behalf of service establishment

10   (SE). The preferred embodiment assumes that the personal settlements exchange (PSX) takes on this responsibility fully. In order to manage the potential for payment delays and shortfalls, the personal settlements exchange (PSX) evaluates, based on historical performance, the existence and degree risk associated and determines a risk premium to be added to household payments. Importantly, the calculation

15   involves both a direct and an indirect (or normalizing) calculation, resulting in a spreading of the payment risk across the universe of households (HH) paying a given service establishment (SE). The following are the major steps in the evaluation process:

(i)   analyzing historical payment patterns verses. due dates and timing for

20   all service establishment (SE), financial institutions (FIN) serving households (HH);

(ii)   computing a payment risk factor for households (HH);

(iii)   computing a receivables risk factor for service establishment (SE);

(iv)   normalizing the household (HH) and service establishment (SE) risk factors into a single coherent factor.

25   Process 203 compiles the results of the risk factor calculations and applies them directly to adjusting the payments due from households (HH). The result is a risk-adjusted, or proforma, payment which improves the odds that the personal settlements exchange (PSX) will receive timely and full payment. Key steps include:

(i)   compiling computed or normalized risk factors;

30   (ii)   computing risk-adjusted service establishment-specific payments for each household (HH).

Process 204 is a method of calculating an obligation value for each household (HH). The objective is to arrive at a single monetary value of payments that the household (HH) will make on a continuing basis to settle all of its service establishment (SE) obligations. In practice, this amount can be a variable periodic

5 amount or a level payment, and may or may not include the risk adjustments noted earlier. In the preferred embodiment, we have assumed a constant or level payment, and we have added the earlier steps to protect the personal settlements exchange (PSX) from the risks inherent in carrying the receivables and collection responsibility on behalf of service establishment (SE) and financial institutions (FIN).

10 With these special features in mind, process 204 involves the following general steps:

(i)   compiling the computed and normalized risk-adjustment factors with which to adjust each household's payment or obligation value to each service establishment if needed;

15 (ii)   consolidating all household service establishment payment obligations into a single value;

(iii)   further calculating a constant consolidated obligation value.

Functional process 205 provides a method of downloading the obligation value, service establishment (SE) billing data, and billing statement content and

20 format detail from the personal settlements exchange (PSX) to each household's (HH) financial institution (FIN). The goal of this process is twofold: first, to send information to the financial institutions (FIN) that will enable them to know the specific household (HH) accounts to be debited for payment and the correct debit amounts; and, second, to provide the financial institutions (FIN) with the information

25 needed to create, format, and inform the generation of consolidated household (HH) -obligation statements. These consolidated statements represent a combined list of all payments made, payments due, service establishment service consumption data, promotional materials, and any other items that might reasonably be included in a combined statement for all service establishment (SE). It is understood that while

30 we have identified financial institutions (FIN) as the conduit for this information, any

intermediary serving this function is equally encompassed. Execution of the following steps accomplishes these goals:

       (i)   establishing an electronic connection and language protocols between the personal settlements exchange (PSX) and the financial institutions (FIN);

5   (ii)   creating and formatting of household (HH) consolidated billing and service statements;

       (iii)   correlating household (HH) personal settlements exchange (PSX) identification number data with household (HH) financial institution (FIN) and specific account identifying numbers;

10   (iv)   downloading household (HH) bank account numbers, consolidated obligation values of households (HH), household service consumption data, and billing statement format and content detail to financial institutions (FIN).

Functional process 206 is a method of instructing financial institutions (FIN) to electronically debit from or charge to the household (HH) account, the consolidated

15   obligation value. The purpose of this step is to move from the information results achieved in the prior processes to effecting actual cash and value transactions in the banking or payments network sector. In the preferred embodiment, in which the receivables and collection risk is borne by the personal settlements exchange (PSX) on the behalf of service establishment (SE), this process also contains an exception

20   management system for processing late and partial payments from households (HH). A specialized exception management function is desirable in any large-scale payment processing system, so that as high a percentage as possible of members enrolled in the system can be retained, rather than rejected for payment deficiencies. Households (HH) that cannot be retained create a costly processing

25   problem for service establishment (SE) and financial institutions (FIN) alike; they continue to use household (HH) services and to eventually pay for them, but they force the maintenance of alternate systems for handling these exception cases. The most efficient solution is the design and operation of a highly automated process for managing exception cases inside the personal settlements exchange (PSX) itself.

30   In the preferred embodiment, process 206 executes the following steps toward this end:

(i)   issuing household-account debit instructions to financial institutions (FIN);

(ii)   channeling failed payments or specially designated household accounts to an exception handling system;

5   (iii)   processing additional payments generated from exception management;

(iv)   confirming debited payments from households (HH), including exception cases, including tracking by bank, household account, and amount of debit or charge.

10   Functional process 207 is a method of making single, aggregate payments to service establishment (SE). The goal of this process is to transfer from financial institutions (FIN) to service establishment (SE) the cash value that has been debited from service-consuming households (HH) and held pending payment to service establishment (SE). The steps for transferring these payments from financial

15 institutions (FIN) to service establishment (SE) are as follows:

(i)   accumulating into a single amount all of the household obligation (HH) values destined for the same service establishment (SE);

(ii)   downloading to selected financial institutions (FIN), their intermediaries, or payment networks, account identification data and crediting information for service

20 establishment (SE);

(iii)   instructing financial institutions (FIN) to issue the aggregate value of the collected payments to service establishment (SE) designated.

Functional process 208 provides a method of identifying to service establishment (SE) the accurate application of the aggregate payments received to

25 the individual household accounts (HH). The goal of process 206 is to effect the transition from payment (which has already taken place with the aggregate transfer) to actual settlement through posting to individual household accounts (HH). With this step households (HH) are ensured of knowing that their accounts are settled, and service establishment (SE) are ensured of knowing which households (HH) have

30 paid for services consumed. The following steps are envisioned in the invention:

(i)   confirming correspondence between aggregate payments made and the payment instructions;

(ii)   generating a list of individual households (HH) and their corresponding payments by service establishment;

5   (iii)   sorting the household payments list by service establishment;

(iv)   sorting the service establishment specific household payments list by service establishment account number;

(v)   downloading electronically or by other means to service establishment (SE), the list of applied household account payments specific to the service

10   establishment in question.

Figure 3 shows an exemplary hardware configuration and apparatus for carrying out the information processing, communications, database management, and operational methodology of the present invention. In the preferred embodiment, this hardware equipment configuration would be installed at a central or regional

15   processing center, and would contain communication means to connect it with service establishments (SE) 101 and financial institutions (FIN) 104.

The personal settlements exchange (PSX) 103 is composed of a communications controller 306 which links multiple data lines from service establishment (SE) storage systems 304 and communications controllers 305.

20   Service establishments (SE) and the personal settlements exchange (PSX) communicate service, billing, and payment data over these apparatus. Modem 307 enables the data lines to communicate with the personal settlements exchange (PSX) computing system by way of a channel support interface 308 which coordinates communications and data transfer among the modem 307, database

25   management and data warehouse systems 309, the central processing unit (CPU) 311 of the personal settlements system, and electronic linkages to other regional processing centers through the multi-system connector 321. The database management system 309 is connected to high-volume storage facilities 310 which house the integrated database of household (HH), financial institutions (FIN) and

30   service establishment (SE) data. Customer service workstations 312 are provided for telephone and electronic communication between households (HH) 102,

financial institutions (FIN) 104, and service establishment (SE) 101; and the workstation controller 313 manages the linkage to the computer system central processing unit (CPU) 311.

Households (HH) 102 and customer service representatives 312 can
5   communicate by telephone or computer through private branch exchange (PBX) 314 and modem system 314. A network of audio response units (ARU) 315 intercepts and channels calls by providing a menu of call options for customers to minimize the staffing level needed to manage high-volume telephone traffic. The communications controllers 306, 316, 317 manage the voice traffic flow between the personal
10   settlements exchange (PSX) 103, service establishments (SE) 101, and financial institutions (FIN) 104, while system-to-system data communications are handled across modems 307 and 318. In the financial institutions (FIN) 104, communications controllers 319 receive and manage data flow to and from personal settlements exchange (PSX) 103, storing data in storage devices 320 as needed for transaction
15   support, as well as for the compilation and generation of consolidated household (HH) statements by statement compilers 322. At least one of the financial institutions (FIN) 104 linked to the personal settlements exchange (PSX) network would house the reserve accounts 323 which are linked electronically to the personal settlements exchange (PSX) 103 in order to provide a dedicated channel for
20   directing the accumulation or drawdown of reserve funds to support the ability of the personal settlements exchange (PSX) 103 to pay service establishments (SE) 101.

In time period t=0, before the first payment cycle is initiated, financial institutions (FIN) 104 and service establishments (SE) 101 subscribe to the system. Millions of consumer households (HH) could be introduced to the system through
25   subscription by service establishments (SE) 101 and financial institutions (FIN) 104. Financial institutions (FIN) 104 are especially valuable as subscribers because of their ability to deliver millions of their account-holding customers and because these account holders already use checking accounts at these same institutions to make monthly recurrent payments to the same service establishments (SE) 101 that will
30   become subscribers and payees in the present system.

Figure 4 is a flow diagram in five (5) parts, A through E, which shows the overall functioning and methodology of the system in terms of computer-implemented instructions of the present invention. Figure 4A shows the creation and updating of the initial databases for new subscribers to the system, and the manner
5   in which the financial institutions (FIN), service establishments (SE), and household (HH) databases are correlated and labeled with a unique identifying personal settlements exchange (PSX) account number for overall tracking and control of the transactions in the system. Figure 4B provides an overview of the method by which household (HH) payment risk is evaluated and the proforma payment amounts
10   calculated for each household (HH) and by each service establishment (SE). Figure 4C illustrates the processing of a payment cycle, including the handling of partial and delayed payments through the exception management system of the present invention. Figure 4D identifies the elements and relationships in creating and managing a personal settlements exchange (PSX) liquidity reserve. Figure 4E
15   shows the flow detail underlying actual settlement: payment application and crediting to account, notification to service establishment (SE) of payment, and updating of system databases in preparation for the next payment cycle.

       Referring first to figure 4A, the data received from service establishments (SE) and financial institutions (FIN) is uploaded 404, 405 to storage 406, matched across
20   financial institution (FIN) and service establishment (SE) data by common household (HH) identifiers 407, tested for file-matching 408, and then labeled 409 with a unique personal settlements exchange (PSX) identifying number. Once filtered for duplication, and completed matches, the entries are arrayed 410 in a database containing or linked 410 to the historical information transferred from financial
25   institution (FIN) and service establishment (SE) source files.

       — — —The resulting conceptual database contains relational data structures capable of being viewed from household (HH), financial institution (FIN), or service establishment (SE) perspectives or views. The representative detail shown in figure 4A.1 shows a conceptual relational database 450 representing the combined
30   household (HH), service establishment (SE), and financial institution (FIN) databases of the personal settlements exchange (PSX) such as created in figure 4A.

Households (HH) are indexed as HH(i) i through I, with I being the total number of households (HH) in the system. Service establishments SE(j) are indexed j through J, with J being the total number of service establishment (SE) in the system. Financial institutions FIN(f) are indexed f through F, with F being the total number of

5   financial institutions (FIN) in the system. Within any SE(j), there are number-identified household (HH) service accounts (such as the electric utility account number for a specific household (HH)) i through I for each SE(j).   Households (HH) and service establishment (SE) may each own more than one financial account, and for each financial institution FIN(f), there are financial accounts k

10   through K belonging to households HH(i), and, I through L, for financial accounts belonging to service establishment (SE). At any point in time T= t, the relational databases contain data specific to that time period. Historical data is in system memory as snapshots of data tables at time T=t less than the current value of t. A PSX(i) identifying number is assigned to each record of the database, and can serve

15   as a key to accessing and retrieving any view of the database, primarily using the household (HH) as the search reference.

       Database 451 shows the household (HH) database contained in 450, exploded to provide additional detail. For each data record or file, HH(i), the database contains the service establishment SE(j) account number for all of HH(i)

20   SE accounts j. This database contains the record of the volume of household (HH) service consumption or usage, HH(i)(j)V, and its billable value, HH(i)(j)\$. It is understood that the "\$" symbol is shorthand notation for any currency in any form that may be used. A corresponding PSX# is keyed to each household (HH) record in the database to serve as a common identifying link between databases.

25   Database 452 is the service establishment (SE) dataview. In this representation, the notation V for volume of services and \$ for value of billables is the same as in database 451. In the present case, SE(j)(i)# is the service establishment j account number or reference number for its service relationship with household, HH(i), and the variables SE(j)(i)V and SE(j)(i)\$ represent the actual

30   volume of services provided and their corresponding actual or billable cost. In the far right column of conceptual database 452, each service establishment (SE) is shown

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to have a number of PSX # household (HH) identifiers, i,...,I associated, and these
are in a one-to-one mapping back to service establishment (SE) household
accounts, and provide the database relational key to other views of the data.

Database 453 is the financial institution (FIN) dataview, FIN(f), explosion of
database 450. The column designations indicate the following data elements:
FIN(f)(i)(k)#&$ is shorthand definition of the financial account, k, belonging to
household HH(i), in financial institution (FIN) f, designated by the account number #
and with a value balance of $. Similarly, service establishment SE(j) holds account I
at financial institution f, with corresponding account number, #, and value $. The
unique data reference, PSX(i)(j)(f)$ represents the value of dollar flows (billable,
billed, payable, or paid) at financial institution f between household i and service
establishment j.

When this value is summed across all households HH(i) for a given service
establishment SE(j), the result is the aggregate value of all cash transfers to be paid
to service establishment SE(j) from household (HH) accounts at financial institution f.
Alternatively, and with the same value, PSX(i)(j)(f)$ represents the amount billed in
period t. In variants of the system, $ and V may denote actual, proforma, estimated,
cumulative, historical, or other perspectives on value $ and volume V of service
consumption. When summed across all financial institutions (FIN), FIN(f), the result
is the total cash value in the system to be paid from all households (HH) from all
financial institutions (FIN) to SE(j). In the normal course, any difference in $ across
all households (HH) volume verses their service establishment (SE) indicates a
surplus or deficit in payments.

Databases 454 (for households (HH)) and 455 (for service establishments
(SE)) enable the data arrays HH 451 and SE 452 to be matched with their respective
financial account data from array FIN 453 in the personal settlements exchange
(PSX). In each, the view from the household (HH) or service exchange (SE)
perspective is married with the corresponding financial institution (FIN) account
ownership and values to identify for households (HH) the availability and source of
funds from households (HH) to be used to settle household (HH) obligations to

service establishments (SE) in time period T=t , and for service establishment (SE), the corresponding credit to SE accounts with respect to billings requiring settlement.

The final database of figure 4A.1 is the settlement matrix 456, combining the financial institution (FIN) transform database elements for both household (HH) and

5   service establishments (SE) with the required value flows from the financial institution (FIN) database 453. Together, these relational structures identify the required debits, satisfying payments, and source and destination financial accounts for effecting settlement of all system obligations in time period T= t. The settlement database is conceptually the detailed mapping from overall financial institution (FIN),

10   households (HH), and service establishments (SE) sets to specific and unique HH(i), SE(j), FIN(f) elements to household (HH) source account, k, and receiving service establishment (SE) account I. In summary, the relational data structures in figure 4A.1 provide the linkage between the financial accounts to be used by the household (HH) and by the service establishment (SE), in a mapping denoted as the settlement

15   database 456. Consequently, the database construction and its continuous updating and management provide a direct mapping from the household (HH) account to the service establishment (SE) account through the financial institutions (FIN) used by each party for each time period t. The result is the ability to understand and eventually direct payment flows from one account to the other using the designated

20   financial institutions (FIN) of each and capturing the exact values billable, billed, payable or paid.

The dimensions of the databases of figure 4A.1 embrace all financial institutions (FIN), all service establishments (SE), service establishment (SE) financial accounts, all households (HH), and household (HH) financial accounts

25   registered with the system. In many cases, financial institutions (FIN) will also be service establishments (SE) and will receive payments. For example, a financial institution (FIN) that provides checking accounts and brokerage services, car loans, and a mortgage to the same household (HH) will have the financial institution (FIN) checking accounts registered as payment accounts for direct debit, the auto and

30   mortgage loans registered as service establishments (SE) which receive payments, and the brokerage account registered as both financial institutions (FIN) and service

establishments (SE) accounts, since it may be a recipient of funds for services in the brokerage mode, and a source of funds in the payment mode. Accordingly, it is possible to have the same account registered as both service establishment (SE) and financial institution (FIN), depending on the inward versus outward direction of
5   funds flow expected. Funds may also flow to financial institution (FIN) accounts ordinarily used for payments out, in the case of credits or refunds, which the personal settlements exchange (PSX) is also equipped to handle.

At any point in time, the settlement database may be in or out of balance. While the amount billed to household HH(i) by service establishment SE(j) is
10   represented by SE(j)(i)$ will be identical to the amount due to service establishment SE(j) from the household HH(i), the actual payment may be greater (putting the system into surplus) or less (deficit) than this amount. The total net value of all system surplus and deficit payments represents the amount which, in the preferred embodiment, the personal settlements exchange (PSX) would be out of balance.
15   Deficits would need supplementing from reserve accounts, and surplus funds would be put into a reserve to maintain that fund as protection against future shortfalls. Finally, the personal settlements exchange (PSX) charges a small fee for services provided. These charges will change flow values slightly if payments to service establishment (SE) are made net of deductions for these charges.
20   Further to the interpretation of the settlement matrix database 456, for any horizontal data vector f in 456, the summation of PSX(I)(j)(f)$ across all households HH(i) with financial accounts in financial institutions FIN(f) for payment to service establishment SE(j) is another representation of the aggregate payment due to that service establishment (SE) from households (HH) paying through financial institution
25   FIN(f).

Additional detail on the potential structure of the records in the household (HH) and service establishment (SE) databases is provided in figure 4A.1-1, which is an expanded detail of figure 4A.1. The central identifying and matching data key is the household (HH) personal settlements exchange (PSX) identification number
30   (HH-personal settlements exchange #) in record 461, which is common to all database views of the same household (HH). In records 464, for example, each

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household (HH) in the service establishment (SE) database view is identified in the personal settlements exchange (PSX) with the HH-personal settlements exchange (PSX) identifier. In addition, the unique personal settlements exchange (PSX) identifier for each service establishment (SE) is also reflected in the records of each

5   household (HH), which is a subscriber to the services of the service establishment (SE). From the standpoint of dimensions, each service establishment (SE) record could contain millions of customer accounts, and for each household (HH), there might be a handful of service establishments (SE) providing basic household (HH) services, and tens of others for additional services.

10   Referring now to figure 4B, the payment risk analysis and the computation of proforma payments which help manage payment risk are detailed. Step 502 provides for the analysis of historical payment performance by households (HH). Payment risk is characterized statistically, and calculated 503 for both households (HH) and service establishment (SE), and then made consistent through a

15   normalization process 504. The normalization calculation serves two purposes: (a) providing an aggregate measure of the overall payment risk to a specific service establishment (SE), and (b) providing a baseline for assessing whether a particular household (HH) is a higher or lower payment risk than the universe of households (HH) served by the service establishment (SE) in question.

20   When the risk factor is applied to the payment due from each household (HH), the risk-adjusted proforma payments are greater than payments that would be due solely based on actual service consumption. However, the large population effect operating through the normalization process will tend to attenuate the impact of both extreme risk cases and exceedingly reliable payers, reducing the amount of

25   premium that need be paid by a specific household (HH). The present invention calculates these household (HH), service establishment (SE) and normalized risk factors, and applies it 505 to the payment flows to derive the risk-adjusted or proforma payment required. The proforma obligation can be, as in the present embodiment, a consolidated value combining 506 all individual payments due to

30   service establishment (SE) into a single periodic obligation.

Referring to figure 4B.1, the detailed computation of payment risk factors proceeds in three phases: first, across households (HH); second, across service establishment (SE); and then normalized between both. These major phases and their related detailed computational steps are as follows:

5   In Phase 1, we determine household payment risk for each service establishment (SE) across all service establishments (SE), using the following steps:

(i)   analyzing 551 historical payment patterns and service utilization by household (HH);

(ii)   evaluating the 552 difference between the amount of payments
10   received from households (HH) and the amount due;

(iii)   evaluating 553 the difference in timing between receipt of payment from households (HH) to service establishment (SE) and the due date of the payments;

(iv)   applying 554 an internal interest rate to projected variances in time and
15   amount to determine the potential costs associated with late or insufficient payments;

(v)   computing 555 the household (HH) payment risk factor for each household (HH) and each of its respective service establishment (SE), individually;

(vi)   repeating for all service establishment (SE) and households (HH) 556,
20   557.

In the second phase of the payment risk factor calculation, we determine the service establishment (SE) specific receivables risk. The central steps in developing the service establishment (SE) receivables risk factor are:

(i)   analyzing historical payment patterns and service utilization for each
25   service establishment (SE);

- - (ii)——evaluating 559 the difference between the amount of payments received from households (HH) and the amount due;

(iii)   evaluating 560 the difference in timing between receipt of payment from households (HH) to service establishment (SE) and the due dates of the
30   payments;

(iv)   computing 561 the household (HH) receivables risk factor for each service establishment (SE);

(v)   repeating 562 for all service establishment (SE).

5   The final phase of payment risk factor analysis is a method of adjusting the payment risk factors of households (HH) by normalizing them to the receivables risk faced by service establishment (SE). Application of solely a household (HH) specific risk-adjustment factor to an individual household's)HH) payments might provide for an excessive incremental risk premium payment, leading to aggravation of the

10   payment risk that the system is trying to minimize. By contrast, when modified by the overall payment risk of the service establishment (SE) across all households (HH) served, the risk of charging too high a premium is reduced. Three steps are involved in this final phase of payment risk factor analysis 563:

        (i)   comparing the service establishment (SE) receivables-risk factor

15   coefficient to the household (HH) payment risk factor coefficient;

        (ii)   determining the algebraic relationship between the two different factors; and

        (iii)   computing an adjusted payment risk factor for each household (HH) for each service establishment (SE) to which payments are made.

20

        In summary, then, there are three key dimensions to analyzing and spreading the payment risk of households (HH) to service establishment (SE): variance in time and amount measured across service establishment (SE) for a specific household (HH); the same captured across households (HH) for a specific service

25   establishment (SE); and both normalized to arrive at an internally consistent pooled factor applicable to the payment in question.

        In addition to using risk factors to adjust household payments, the process can also be used as a flag for automatically transferring 563 certain households (HH) with a payment risk factor (PRF) in excess of a threshold level to special handling in

30   the exception management system of the present invention. There, the household (HH) can be put into a deferred, rescheduled, or extended payment plan which

would lower the likelihood of default, and encourage consistent and reliable payments.

Figure 4B contemplates three unique payment values: first, the *periodic* payment amount payable 505 by household HH(i) to service establishment SE(j) which we have just addressed; second, the *consolidated* periodic payment amount 506 due from specific household HH(i) to *all* service establishments SEs(j) serving household HH(i); and finally, the *aggregate* payment amount due 507 from *all* households (HH) to a *specific* SE(j).   Referring now to Figure 4B.2, further detail of consolidated and aggregate payment calculations is seen. Figure 4B.2 is a flow diagram of the actual computation of proforma payments or obligation values from consuming households (HH) to service establishments (SE).

The specific steps in calculating the household (HH) specific *periodic* payment amount are:

(i)   retrieving 571 historical billing information;

(ii)   computing 572 the initial periodic payment amount from household HH(l) to service establishment SE(j), based on the arithmetic average or statistically projected amount;

(iii)   retrieving 573 the normalized household payment risk factor calculated in the payment risk factor process;

(iv)   computing 574 the proforma period payment amount using the above inputs. This results in a single, constant risk-adjusted payment amount unique to each household, for payments to singular SE(j).

The *consolidated* household payment value is derived from the following steps:

      —(i)——repeat 575 for all service establishments SE(j) serving household HH(l);

(ii)   compute 576 the consolidated proforma periodic payment amount sufficient to paying all service establishment (SE) serving household HH(l). The result is a constant consolidated payment amount for paying a plurality of SE's serving the household.

The inventive process contemplates each service establishment (SE) receiving from the financial institutions (FIN) served by each household (HH), a constant stream of cash payments on a routine periodic basis. So, instead of making out bills to millions of individual households (HH); incurring the risk of credit
5 and collection; receiving, recording, and crediting payments; and evaluating the volatile profit and loss and balance sheet impact of a given period's service and billings; each service establishment (SE) simply receives with certainty a fixed dollar amount from one or several financial institutions (FIN). Referring again to figure 4B.2, the calculation of these *aggregate* (HH) household payments proceeds in the
10 following steps:

   (i)   repeat 577 the calculation of household consolidated proforma payments for all households (HH) in the population;

   (ii)   calculate 579 the total proforma periodic payments from all households (HH) to specific SE(j);

15   (iii)   repeat 580 for all service establishment (SE) in the network.

Figure 4C is a flow diagram outlining the system payment cycle of the invention. Its function and corresponding execution in the data processing components shown in figure 3 will now be described. Individual service establishments (SE) download 601, 602 their period service and billing detail data to
20 the personal settlements exchange (PSX) 103 (figure 3) from the storage devices 304 and communications controllers 305, through the modem 307 and channel support devices 308 of the personal settlements exchange (PSX) of the present invention. The information is then directed to the database management system 309 for incorporation into the matched and labeled functional database 410 (figure 4A).
25 This information is stored 602 (figure 4C) in the storage devices 310 (figure 3), and processing is executed in the data processing devices 311 of the personal settlements exchange (PSX) system 307 to 311, (figure 3). This information is processed 603 in the personal settlements exchange (PSX) data processing system 311 (figure 3) and then uploaded 604 to the financial institution (FIN) data processing
30 system where it is stored 605 for later use in generating consolidated billing statements through statement generators 322 and later issued to household (HH)

customers. Data communication, uploading, and storage is executed through the personal settlements exchange (PSX) devices 311 personal settlements exchange (PSX) 103 central processing unit (CPU) 311, channel support device 308, modem 318, and communications controller 317. In the financial institution (FIN) sector, the

5   communications controller 319 manages the data flow from the personal settlements exchange (PSX) to the financial institution (FIN), finally leading to storage devices 320. It is anticipated that all communications among the personal settlements exchange (PSX), financial institutions (FIN), and service establishment (SE) would be encrypted for security.

10   Figure 4C.1 provides further detail of figure 4C, and is a flow diagram of the processing of service establishments (SE) service and billing data received from each service establishment (SE) for the current payment cycle. In this subroutine, accounts may be coded and flagged for special handling as appropriate. Service establishment (SE) transmissions are first authenticated 631 for security purposes,

15   and the identity of the source service establishment (SE) is verified through its registered service establishment (SE) personal settlements exchange (PSX) identification as well as through periodically changed authentication codes. A data matching process is performed 632 to accurately create and update the household (HH) service and billing data for the period, consistently tying these back to the

20   correct household (HH) identifiers PSX-HH# 632, 633. These database updates prime the system for the current period's billing and payment instructions. Before further processing, special file codes, status indicators, and tolerance limits are identified 634 and processed to cue the data processing system to special requirements, new information, unique file handling, or other distinctive processing

25   needs. If special handling is required 635, the system tests for whether such handling is new to the system 636 or constitutes a repeat of handling performed or signaled in prior cycles.

New conditions, such as significantly higher service usage compared to prior periods, are specially flagged with new handling codes 637. Existing conditions or

30   status codes, such as a system-wide promotion of discounting to encourage participation in the personal settlements exchange (PSX), for example, will be

immediately recognized and, in both cases, the appropriate handling instruction is retrieved 638. These might encompass triggering alternate payment arrangements, adding interest charges, paying rebates, or making promotional adjustments, according to the specific conditions present in the service establishment (SE) data
5   file for the period in question.

With the service establishment (SE) data file now downloaded and condition statements prepared, the individual household (HH) payment file is retrieved and processed 639. In the systems environment of figure 3, database management 309, storage system 310, and central processing unit (CPU) 311 are where these
10   activities are centered. In most cases it will be efficient to use temporary storage in so-called cache memory to process individual household (HH) current period file records to minimize the continual access to and retrieval from high capacity storage devices through the transaction processing cycle. During processing of each service establishment (SE)'s data file, the household (HH) specific charges and services are
15   compiled for each household (HH) file in the universe of households (HH) served by the service establishment (SE) and registered 640 with the personal settlements exchange (PSX). At the same time, the basis for a consolidated household (HH) statement is being compiled 641 for the current payment cycle. This processing is repeated 642, 643 for all households HH(i) and all service establishments SE(j),
20   respectively, until the complete period consolidated debit amount is compiled. Then the system is returned to upload 604 in figure 4C.

Reference to figure 4C.1-1 shows yet additional detail on the nature of the processing which each service establishment (SE) data file record might undergo in the preferred embodiment. This further detail is consistent with both the conceptual
25   database model 452 (figure 4A.1) and the more detailed illustrative database model of the service establishment database view 463, 464 (figure 4A.1-1), which is repeated in high-level schematic as 661 of figure 4C.1-1. The data fields of the downloaded service establishment (SE) records contain specific information 663 with the following detail and function:
30   1.   The data record contains HH-PSX#, the unique identifying number for households HH(I) keying to all other personal service exchange (PSX)

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databases and data views, including other service establishment (SE), financial institutions (FIN) and historical transactions and profile data.

2.   The data record also contains the unique personal service exchange (PSX) identifying number for the current transmitting service establishment SE(j), identifying it to the personal settlements exchange (PSX), and triggering links to other elements of the process system in personal settlement exchange (PSX), such as retrieval of financial institution (FIN) accounts associated with the service establishment (SE).

3.   Figure 4C.1-1 663 also shows the service establishment's (SE) internal account numbers for the households (HH) served. This data is used by the personal settlements exchange (PSX) as a secondary reference and internal payment-application account number, so payments made can be later associated with the household (HH) and the service establishment (SE) account code for accurate crediting of payments.

4.   Data field 4 of 663 shows the current actual service consumption volume by household HH(i). After this information has been evaluated on an historical basis at the stage of initial enrollment, personal settlement exchange (PSX) tracks and cumulates service consumption patterns as part of the risk management programming described earlier. Earlier information on usage can be retrieved by searching for the same data on earlier T=t – n indexes in the database.

5.   Similarly, data field 5 in 663 of the illustrative database record carries the current billing information consistent with the usage pattern of the household (HH) if, however the service establishment (SE) believes it is relevant to track such information. This may differ from actual, as for example, in the case of meter readings which are only physically carried out at quarter-end periods. The intervening months are necessarily estimates, and there is no more accurate information in the system to provide direct cost measurements.

6.   The data file 663 also contains a field 6 with unique condition indicators or codes providing flags to the personal settlements exchange (PSX) indicating how the file should be handled in the personal settlements exchange (PSX) system. For example, referring to 4C.1 step 634 indicates that processing of

service establishment (SE) billing data involves reading file codes and sorting on these codes for special handling. The personal settlements exchange (PSX) assigns, attaches, or revises these codes as needed 637, and then handles a particular file in the manner dictated by the code in question. These codes would

5   dictate such factors as risk thresholds, promotional opportunities, cross-selling linkages, etc.

7.   Additional fields cover the date and any additional fields for text messages. For example, special notes from customer service contacts might be appended to the file in this field.

10   Returning to figure 4C, the above processing and communication results in the transmission 605 of files containing consolidated proforma (or actual debit detail) for each household (HH) to financial institutions (FIN) throughout the region served by the personal settlements exchange (PSX). These debits are executed by each financial institution (FIN) receiving such instruction 606, and these transactions may

15   or may not be successfully completed 607 for any number of reasons, especially related, for example, to the sufficiency of funds in the household (HH) account. The system will retry these debits for a certain number of times before rejecting the file out as a failed payment instance. If, on the other hand, the debit is successfully completed advice to that effect is created and issued 608, 609 to the personal

20   settlements exchange (PSX) through the communication system between the financial institution (FIN) and the personal settlements exchange (PSX) sectors of the overall system (figure 3).

In the specific case that a debit or charge transaction has failed to execute in financial institution (FIN) 607, the failed debit is returned to the personal settlements

25   exchange (PSX) exception management system 610 for further handling. In the unlikely event that exception management fails to correct the failed debit, or if further coordination between service establishments (SE) is needed for any reason, the personal settlements exchange (PSX) transfers the file or makes specific requests to the service establishment (SE) sector 611 which may move to terminate services

30   612, or in the alternative, allow the personal settlements exchange (PSX) to continue 610 with further management in the exception system.

A variety of methods are available in the exception management system in the personal settlements exchange (PSX), and these are designed to try every possible approach to retaining households (HH) within the personal settlements exchange (PSX), and keeping payments flowing, even if they are below the actual, proforma, or other desired level for a given period of time. In figure 4C.2, an exception instance or event is first identified as having occurred 651, and it is further identified as to type and severity in a table of exception events 652. Examples of representative exception events include, for example, partial payments, zero payment, negative risk factor changes, and technical payment failures. The specific event type has established handling protocols, and the manner in which these are invoked may, in some embodiments of the invention, depend on the condition and standing of the specific household (HH) data file record in question. For example, a file with a history of partial and zero payments will be managed under a different rule than one in which a partial payment had first been encountered.

In the present invention, this system rules table 653 might contain dozens of rules for the many permutations of exception event and household (HH) record status that might exist. The payment risk factors which are continually computed 555 (figure 4B.1), combined with the file handling codes assigned 637 for specific cause, would together constitute a matrix of household (HH) record status codes that, together with a specific event, would define the appropriate rules for managing 653 a specific exception event. Accordingly, the system rules table 653 contains automatic if/then conditional directives such as, "if a 50% or better partial payment is received from household HH(i) of standing good or better (based on history), then invoke rule R1 accepting payment and process under system procedures P-2, otherwise reject payment..."

- -Until a specific history is created for each household (HH) payment file, the payment risk factor (PRF) is likely to be the first determinant of system handling and rule application, simply based on the severity of the exception event. Alternatively, the data retrieval requirements may become so large that for efficiency the system may invoke rules uniformly and then retrieve files for status and history tracing as part of the application of systems procedures after the rules have been applied. This

is the sequence depicted in figure 4C.2, in which the file for household HH(i) is retrieved 653, 654 after the event has occurred and the rules are applied, and the system then determines whether to proceed with additional processing under programmed exception procedures.

5   The exception management system in the personal settlements exchange (PSX) contains a system procedures table 654 seen in figure 4C.2, which manages the personal settlements exchange (PSX)'s handling of exception events under given rules. The exception management system selects the most important criterion for determining how the system should respond to a particular event, taking into

10   account, for example, the rules, the household (HH) record history, the event encountered, and the time period within which the event should be resolved (e.g., within the current payment cycle). The exception management system also assigns special tracking codes based on event, file history, and the proposed resolution, and manages notification routines to financial institution (FIN) and service establishment

15   (SE) sectors as appropriate. Finally, the procedures table selects the appropriate system response to an exception event by reference to an event response table 655. A range of responses is available, including, for example, retrying debits, shifting to alternate debit sources, allowing partial payments, rescheduling of payments over a longer time period, and contacting the customer for additional information or to

20   confirm commitments to pay.

Once the event response is selected, handling is returned to the procedure table, which communicates as appropriate with service establishment (SE)'s and financial institutions (FIN), and assigns a tracking code based on the response selected. The database system is then updated 656 to reflect the event

25   management and forward processing, and the exception routine is returned to transaction processing 610 to 607 as required, figure 4C. There, new payments may be processed, if appropriate, and the credit advice updated 608 to reflect payments, if any, before uploading to the personal settlements exchange (PSX) database. In figure 4C.2-1, in which further detail is disclosed concerning the partial payment

30   processing mechanism in the present invention, the partial payment processing method is identified, which is an expanded detail of the exception management

system event response table options. As an example, the household (HH) consolidated obligations for the payment period in question total $1,335, and only $1,000 is received. In the preferred embodiment, the household (HH) file record is first retrieved 670 to determine the priority of payments that has been established by the household (HH) 671. If the first allocation of payment is to mortgage or rent, then the minimum amount of the partial payment received is applied to that account 675, and the remainder 676, if any, is then applied to the next priority service establishment (SE) account, seriatim 677, until the remainder is zero 676. The results of this processing (a set of prioritized account payments) is then sent as a payment instruction 678 to the financial institution (FIN) on file in the household (HH) record. If there is no priority established, the personal settlements exchange (PSX) invokes a set of default priorities 674, which may be based on any number of criteria, including, for example, general consumer preference, legal exposure, and interest cost minimization. The partial payments routine then returns file management to the exception management system.

The rescheduled payment processing mechanism of the present invention is discussed in figure 4C.2-2, which is an extension of the exception response table action alternatives 655 of figure 4C.2. Figure 4C.2-2 shows a further detail of figure 4C.2, and is a flow diagram of the processing of rescheduled payments. Under this processing regime, payments are delayed, deferred or extended over time to better match the payment ability of the household (HH) in those cases in which such accommodation might be necessary.

Payment rescheduling is among the more complex management actions in response to failed payments. There is a premium placed on collecting current information and on forming a complete picture of the household's (HH) overall obligations, then determining the time period over which a rescheduling plan should be implemented in an effort to return the household (HH) to current standing and thereby reduce the system default risk to within tolerable limits. Depending on the particular embodiment of the present invention, there may also be a need to communicate in advance with the service establishments (SE) whose obligations are being rescheduled.

In the preferred embodiment, the communication is shown as handled after the rescheduling routine has returned the file to the exception management procedures table. The household (HH) record is retrieved 680 and updated 681 by accessing on-line financial records and credit profiles, and based on this information

5   a disposable income and cash availability base is determined. The monthly outflow already known from the consolidated proforma payments information in the personal settlements exchange (PSX) is then compared 683 with the monthly disposable cash to determine whether there is a deficiency in the ability to meet monthly obligations on a continuous basis. In that event, the household (HH) is contacted

10   684 by customer service representatives about the options and alternatives for restructuring or refinancing the household (HH) obligations. If, in the alternative, there is no permanent deficit, but rather a short term overdue situation, then the system evaluates 685 the actual number of periods past due 686 and on which service establishment (SE) accounts.

15   If the past due amount does not exceed one payment period, the current proforma amount can be extended or spread over the current and next periods, or deferred for later payment in full with the next period's payment due. Alternatively, in the event there is more than one past due period, the past due amount may be spread over several future periods, deferred until payments are current, or some

20   combination of these and other options. It may also be the case that only a subset of payments is past due, while others are current. In order to resolve the household (HH) situation rationally and relatively comprehensively, the system will select a consolidated payment rescheduling profile that best achieves the objectives based on criterion established in the procedures table 654 in figure 4C.2, such as, for

25   example, minimizing system risk, maximizing feasible payments to the system, or minimizing the implicit or explicit interest expense to the household (HH) of the rescheduling program. Once this is established, the duration of the program can be set and then checked 694, the payment risk factor and proforma payment amounts recomputed 695, and payment instructions sent 696 to the appropriate financial

30   institutions (FIN). The system finally returns 697 to the procedures table of the exception management system for final communications and processing.

Figure 3 shows the customer service and communications apparatus that facilitates the execution of the above processes for handling partial and rescheduled payments. Households (HH), service establishments (SE), and financial institutions (FIN) may communicate by telephone, by electronic means, including computer and

5   by modem telephone connection with customer service representatives and management personnel at the personal settlements exchange (PSX). This is facilitated by an advanced private branch exchange (PBX) and modem bank 314 (figure 3), as well as audio response units (ARU) 315 connected to the communications system for automated call handling. The communications controller

10   316 manages the overall communications process, including access to the central processing unit (CPU), as well as direct linkages to customer service representatives. Customer service itself operates a series of workstations 312, each of which is connected through a workstation controller 313 to the central processing unit (CPU) for access to files and on-line processing of data, information requests,

15   and specific transactions.

As previously discussed, in the preferred embodiment, the personal settlements exchange (PSX) might actually take over the management of the billing and collection process for each subscribing service establishment (SE). Consequently, the personal settlements exchange (PSX) would have an obligation to

20   maintain a flow of payments to each service establishment (SE), irrespective of the difficulties it may encounter in collection, rescheduling, or receipt of partial payments. While the payment risk analysis is designed to anticipate and minimize these occurrences, the personal settlements exchange (PSX) also contains a payment reserve and credit enhancement feature which backstops the liquidity of the system,

25   and ensures that payments are made on a timely manner and in full amount to each service establishment (SE).

The cash reserves are monitored and adjusted continually against the overall payment obligations in the system. The funding for these reserve accounts comes from a small deduction made from household (HH) payments, from a portion of the

30   personal settlements exchange (PSX) revenue paid to the personal settlements exchange (PSX) for services performed, or from credit lines. The reserve accounts

may contain cash or provide access to cash through credit lines, and through securities such as, for example, credit derivatives and securitized assets. Should additional cash be required to meet payment obligations to service establishments (SE), it would be sourced from those supporting the personal settlements exchange
5   (PSX) reserve accounts maintained for that purpose.

The reserve monitoring and payment adjustment process is outlined in figure 4D, which shows further detail of the liquidity support and credit enhancement features of the invention. Confirmed actual payments received 701 from households (HH) are applied to their service establishment (SE) obligations, and the payment
10   application file of each household (HH) is updated in each service establishment (SE) 702 accordingly. The difference if any between payments thus applied and the actual amount and due date are calculated 703 and the running variance is continuously monitored in the reserve and liquidity support 707 function supporting the personal settlements exchange (PSX). The status of the variance 703 is also
15   tracked internally in the personal settlements exchange (PSX) so the system can adjust 704 the deductions made for retention in the reserve accounts of the personal settlements exchange (PSX). For example, if the difference between actual and proforma payments grows into a deficit, the reserve deduction deposited to back-up accounts would automatically increase in anticipation of potential shortfalls in
20   available cash to pay service establishment (SE). In the case of a growing surplus (proforma payments exceed actual obligations based on consumption), the retention could reasonably be reduced in view of the reduced need to rely on reserves for payment. The system is also designed to evaluate 705 the difference between expected aggregate payments to service establishment (SE) and the expected
25   available funds from payments received and from existing reserves and credit sources. At the appointed payout time to service establishment (SE), all available funds are paid to service establishment's (SE) and a determination is made to draw 706 from reserve accounts to make up any shortfall to the required aggregate payment value. If additional funds are needed, they are drawn from the financial
30   institution (FIN) sector 708 and changes in the balances and reserves of the personal settlements exchange (PSX) are adjusted and update as needed 709.

Figure 4D.1 shows further detail of figure 4D and is a flow diagram of the liquidity support and credit enhancement features of the present invention. Typically, the amount of the reserve cash balance would be determined by analyzing 751 the historical arrears and write-off history of the pool of service establishments (SE) in

5 the personal settlements exchange (PSX). These historical patterns would then be applied to future periods and values to develop a projection 752 of the potential losses and costs of delayed payments. Based on this projected loss potential, a "first-loss" provision is established for funding 753 these potential shortfalls. Additional facilities, such as insurance and credit can then be employed to provide

10 further protection 754 to the system up to a targeted level.

The final phase of the payment cycle involves crediting to household (HH) account numbers in each service establishment (SE), the payments received. This is seen in figure 4E. Financial institutions (FIN) are instructed to credit the household (HH) payments previously debited from household (HH) accounts to

15 service establishment (SE) accounts, with a small portion of the payment flow also being held to fund 801 reserve accounts described above. Financial institutions (FIN) upload and store 802 this aggregate payment information, transfer 803 funds collected from household (HH) accounts to service establishment (SE) accounts, and download 804 confirmation of the debits and credits to the personal settlements

20 exchange (PSX) 805 and to service establishments (SE) 806.

The personal settlements exchange (PSX) at this stage downloads 807 the service detail and payments made for the prior period, as well as service consumption for the current period, along with current billing information, either actual or proforma. Financial institutions (FIN) receive this information and use it to

25 compile 809 consolidated statements to be sent to households (HH) along with the standard credit card, debit card, or checking account details ordinarily issued to household (HH) account holders. In the preferred embodiment, there is no need for service establishments (SE) to issue statements separately, since all the normal service establishment (SE) statement information has already been communicated

30 to households (HH) through their financial institution (FIN) statement mailings.

The personal settlements exchange (PSX) downloads 810 complete data files to all service establishments (SE) detailing the allocation of the aggregate payment to individual household (HH) service establishment (SE) accounts. This completes the payment process and results in settlement of the original obligation. In the instance

5   in which the personal settlements exchange (PSX) manages all receivables and collection, there is simply a steady stream of cash flowing to the service establishment (SE) on a periodic basis, and the actual status of household (HH) accounts is only meaningful to the service establishment (SE) as an administrative and customer service matter. As long as the personal settlements exchange (PSX)

10   is comfortable with payment performance, the service establishment (SE)'s role is to ensure continued supply of goods and services. The system databases are updated 812 and the payment cycle is indexed 813 to the next period (T= t+1).

It is understood that the preferred embodiment is only one illustrative version of the present invention, and that any number of variations and constructions toward

15   the same ends could be envisioned using the methods and apparatus described; these are equally encompassed in this patent description.

What is claimed is:

1.   A method of payment of bills of service establishments by households, comprising:

    providing a personal settlements exchange with billing information from service establishments;

    calculating an obligation value for each household;

    downloading the obligation value for each household from the personal settlements exchange to a financial institution having a household account;

    instructing the financial institution to apply to the household account, the consolidated obligation value;

    aggregating all of the household obligation values that are destined for the same service establishments; and

    instructing the financial institutions to issue these credits to the service establishment.

2.   The method of paying bills of claim 1, wherein the step of calculating an obligation value calculates a consolidated actual payment value.

3.   The method of paying bills of claim 1, wherein the step of calculating an obligation value calculates a constant proforma consolidated payment value.

4.   The method of paying bills of claim 1, further including generating a single consolidated household billing statement and transmitting the single consolidated household billing statement to each household.

5.   The method of paying bills of claim 4, wherein the step of generating a consolidated household billing statement generates an electronic consolidated household billing statement.

6.   The method of paying bills of claim 4, wherein the step of generating a consolidated household billing statement generates a printed consolidated household billing statement.

7.   The method of paying bills of claim 4, wherein the step of transmitting a consolidated household billing statement is by mail.

8.   The method of paying bills of claim 4, wherein the step of transmitting a consolidated household billing statement is electronic.

9.   The method of paying bills of claim 1, further including the step of issuing to each service establishments a detailed verification of each household's payment.

10.   A method of payment of bills of service establishments by households, comprising:

>   providing a personal settlements exchange with billing information from service establishments;

>   calculating an obligation value for each household;

>   downloading the obligation value and the billing information for each household from the personal settlements exchange to a financial institution;

>   instructing the financial institution to debit from or charge to the household, the obligation value;

>   enabling financial institutions to make payments to each service establishment on behalf of all households served; and

>   identifying to service establishments the correct application to household accounts of the payments received.

11.   The method of paying bills of claim 10, wherein the step of calculating an obligation value calculates a consolidated actual payment value.

12.   The method of paying bills of claim 10, wherein the step of calculating an obligation value calculates a proforma payment value.

13.   The method paying bills of claim 10, wherein the step of calculating a proforma payment value, further comprising:

>   compiling risk factors for households; and

>   computing risk-adjusted service establishment-specific payments for each household.

14.   The method of paying bills of claim 10, further including the steps of generating a single consolidated household billing statement and transmitting the single consolidated household billing statement to each household.

15.   The method of paying bills of claim 14, wherein the step of generating a household billing statement generates an electronic consolidated household billing statement.

16.   The method of paying bills of claim 14, wherein the step of generating a household billing statement generates a printed consolidated household billing statement.

17.   The method of paying bills of claim 14, wherein the step of transmitting a consolidated household billing statement is by mail.

18.   The method of paying bills of claim 14, wherein the step of transmitting a consolidated household billing statement is electronic.

19.   The method of paying bills of claim 10, further including the step of issuing to each service establishments a detailed verification of each household's payment.

20.   The method of paying bills of claim 10, wherein the stop of providing a personal settlements exchange with billing information from service establishments, further comprising:

    enrolling households in the personal settlements exchange;

        downloading historical household information to the personal settlements exchange;

        creating a matched database of households, service establishments and financial institutions (FIN);

        assigning a unique identifier to each household; and

        downloading service establishment billing information on a continuing basis.

21.   A method of paying bills of claim, further, including the step of calculating of payment risk factors for the household:

22.   The method of paying bills of claim 21, wherein the step of calculating payment cost factors for the household further comprises:

        analyzing historical payment patterns for service establishments and financial institutions serving households;

        computing a payment risk factor for households;

        computing a receivables risk factor for service establishments; and

normalizing the household and service establishment risk factors .

22.   The method of paying bills of claim 10, wherein the stop of calculating an obligation value for each household, further comprising:

compiling risk-adjustment factors with which to adjust the obligation value for each household to each service establishment;

consolidating all household service establishment payment obligations into a single value; and

further calculating a constant consolidated obligation value.

23.   The method of paying bills of claim 10, wherein the step of downloading from a personal settlements exchange to a financial institution, further comprising:

establishing a connection between the personal settlements exchange and the financial institution;

creating household billing information;

correlating households with financial institutions; and

downloading billing information detail to financial institutions.

24.   The method of paying bills of claim 10, wherein the step of instructing financial institutions to debit from or charge to the household, an obligation value, further comprising:

issuing household instructions to financial institutions;

channeling failed payments or specially designated accounts to an exception handling system; and

confirming payments by financial institution, household, and amount of debit or charge.

25.   A method of paying bills of claim 10, wherein the step of enabling payments to service establishments, further comprises:

accumulating the household obligation values destined for the same service establishments;

downloading to financial institutions information for service establishments; and

instructing financial institutions to issue the household obligation values to service establishments.

26.   The method of paying bills of claim 10, wherein the step of identifying to service establishments the correct application to individual household accounts of the aggregate payments received further comprises:

receiving from financial institutions of the correspondence between aggregate payments made and the payment instructions;

generating a list of individual households and their corresponding payments by service establishment;

sorting the household payments by service establishment;

sorting the service establishment specific household payments; and

downloading to service establishments, the list of applied household account payments.

27.   A method of providing a personal settlements exchange with billing information from service establishments, comprising:

enrolling households in the personal settlements exchange;

downloading historical household information to the personal settlements exchange;

creating a matched database of households, service establishments and financial institutions;

assigning a unique identifier to each household; and

downloading service establishment billing information on a continuing basis.

28.   A method of calculation of payment risk factors comprising:

analyzing historical payment patterns for service establishments and financial institutions serving households;

computing a payment risk factor for households;

computing a receivables risk factor for service establishments; and

normalizing the household and service establishment risk factors

29.   A method of calculation of proforma payments for household services, comprising:

compiling risk factors for households; and

computing risk-adjusted service establishment-specific payments for
each household.

30.   A method of calculating an obligation value for each household, comprising:

compiling risk-adjustment factors with which to adjust the obligation

value for each household to each service establishment;

consolidating all household service establishment payment obligations
into a single value; and

further calculating a constant consolidated obligation value.

31.   A method of downloading from a personal settlements exchange to a financial
institution, comprising:

establishing a connection between the personal settlements exchange and
the financial institution;

creating household billing information;

correlating households with financial institutions; and

downloading billing information detail to financial institutions.

32.   A method of instructing financial institutions to debit from or charge to the
household, an obligation value, comprising:

issuing household instructions to financial institutions;

channeling failed payments or specially designated accounts to an

exception handling system; and

confirming payments by financial institution, household, and amount of
debit or charge.

33.   A method of making payments to service establishments, comprising:

accumulating the household obligation values destined for the same

service establishments;

- -downloading to financial institutions information for service

establishments; and

instructing financial institutions to issue the household obligation values
to service establishments.

34.   A method of identifying to service establishments the correct application to
individual household accounts of the aggregate payments received, comprising:

receiving from financial institutions of the correspondence between
aggregate payments made and the payment instructions;
generating a list of individual households and their corresponding
payments by service establishment;

5   sorting the household payments by service establishment;
sorting the service establishment specific household payments; and
downloading to service establishments, the list of applied household
account payments.
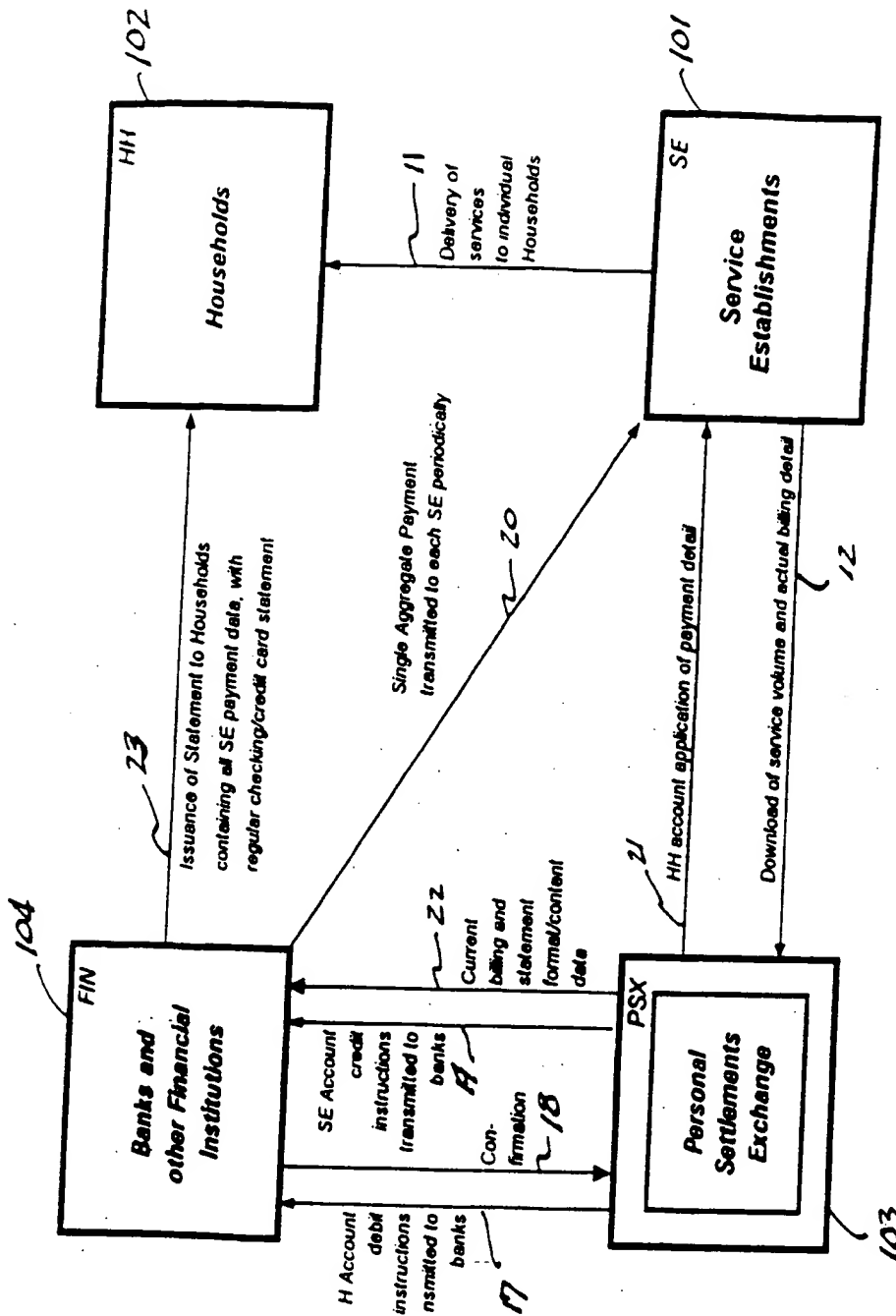
Figure 1: Personal Settlements Exchange Flow Overview

1   201

PROVIDE SE BILLING AND SERVICE DETAIL TO PSX

1   Enroll Households

2   Download historical data

3   Create Matched database

4   Assign identifying number

5   Download ongoing household billing and service data

2   202

CALCULATE PAYMENT RISK FACTORS

1   Analyze historical payment patterns

2   Compute payment risk factor for households

3   Compute receivables risk factor for service establishments

4   Normalize HH and SE factors into single coherent factor

3   203

CALCULATE HH PROFORMA PAYMENT VALUE

1   Compile computed or normalized risk factors

2   Compute risk-adjusted SE payment values for each HH

4   204

CALCULATE HH OBLIGATION VALUE PAYABLE

1   Compile all SE payment values

2   Sum SE payment values to single consolidated total for each HH

3   Adjust or revise as needed

5   205

DOWNLOAD HH BILLING AND STATEMENT DATA

1   Create and format household consolidated statements

2   Correlate household ID numbers in PSX, FIN and FIN-HH accounts

3   Download FIN account, obligation value and statement detail

6   206

INSTRUCT BANKS RE HOUSEHOLD DEBITS

1   Issue HH-account debit instruction to FINs

2   Channel failed payments to exception processing

3   Process additional payments

4   Confirm and track HH debit results

7   207

AGGREGATE SE PAYMENTS AND INSTRUCT CREDIT

1   Accumulate all HH payments to common SEs

2   Download to FIN all acct and SE credit data

3   Instruct FIN to issue SE aggregate credits/payments

8   208

APPLY SE CREDIT TO HOUSEHOLD ACCOUNT

1   Confirm credits/pmts received

2   Generate HH payments list for each SE

3   Sort payment y HH and SE

4   Sort HH payment by SE acct no

5   Download HH payment application list to each SE

Figure 2: Personal Settlements Exchange Core Computer-Implemented Processes

Figure 3: Personal Settlements Exchange System Configuration and Apparatus

Figure 4A: Creation and Updating of System Databases

Service Establishments

Personal Settlements Exchange

Financial Institutions

Service Establishments

Accept HH application to subscribe to PSX service (optional)

(Return point)

404
Download Household service account data files and histories

Personal Settlements Exchange

Accept HH application to subscribe to PSX service (optional)

(Return point)

406
Upload and store input data from SE and FIN sources

407
Match SE and FIN data files by HH

408
Data files match?

No

No

Yes

409
Label matched SE/FIN/HH datafiles with unique PSX I.D. number

410
Create PSX functional database of matched and labeled SE/FIN/HH datafiles

Fig. 4A.1

To Figure 4B

Financial Institutions

Accept HH application to subscribe to PSX service (optional)

(Return point)

405
Download Household financial account data files and histories

Figure 4A.1: Simplified Conceptual Database Model

Record content and processing use in PSX

1	2	3	4	5	6	7	8
HH-PSX#	SE-PSX#	SE-Acct#	SE(i)(j)V	SE(i)(j)$	Codes	Text	Date

Unique PSX identifying number for SE(j) in PSX syntax. An element of the universe of SE providers serving households in any field of service

Unique identifying number for household HH(i) keying to all other PSX databases and data views, including other service establishments, financial institutions, etc. and historical transaction, and profile data,

Service Establishment's internal account number applied to Household HH(i) and used by PSX as secondary reference for verifying identity of HH(i), and for coordinating communication with SE re this account

Current actual service usage by household. Stored in PSX database and cumulated for tracking HH usage patterns, seasonal variations, and linkage to other HH characteristics and behavior patterns Data stored for later generation of formatted statements to HH user, by download to FIN or SE

Current actual billing data based on actual service usage V stored in PSX database and cumulated for comparison to proforma billing rates applied in current and prior periods Data stored for later generation of formatted statements to HH user, by download to FIN SE

Unique condition indicators processed as required

Additional information

From Figure 4C - Step ____

Service Establishment Downloaded data

SE	HH	Data Fields									Time period
		1	2	3	4	5	6	7	8	9	
j1	i										
	1										
	2										
	3	SE Household data record									
j2	4										
	5										
	6										
j3	7										
	8										
	9										
ju	i										
J	i										

See Fig. 4A.1-1

T₁ .... Tₑ Time period

Total number of households HH(i)
Total number of service establishments SE(j)

Figure 4C.1-1: Service Establishment Data Table Processing
[SE Service and Billing Processing Detail]

HOUSEHOLD DATABASE VIEW

Household Data	HH Financial Acct Data		Preferences and priorities				Household Service Establishments Data					
Identity data	Financial ACs	Balances	A	B	C	D	PSX I.D. No	SE Acct No	Consumption	Actual bal	Act payment	Source fin a/c
HH-PSX01							SE1-PSX01	SE1Acct#	SE1Val	SE1Bal	HHSE1Pmt	HH-FinA/C#
							SE2-PSX01	SE2Acct#	SE2Val	SE2Bal	HHSE2Pmt	HH-FinA/C#
							SE3-PSX01	SE3Acct#	SE3Val	SE3Bal	HHSE3Pmt	HH-FinA/C#
							SE4-PSX01	SE4Acct#	SE4Val	SE4Bal	HHSE4Pmt	HH-FinA/C#
							SE5-PSX01	SE5Acct#	SE5Val	SE5Bal	HHSE5Pmt	HH-FinA/C#
HH-PSX02												
HH-PSX03												
HH-PSXnn												

461, 460, 462

SERVICE ESTABLISHMENT DATABASE VIEW

SE Identity Data	SE Financial Acct Data		Protocols				SE Household Accounts Data				
Contact data	Financial ACs	Escrow	A	B	C	D	PSX I.D. No				
SE-PSX01							HH1-PSX01	HH1SE1Acct#	HH1SE1Val	HH1SE1Bal	HH1SE1Pmt
							HH2-PSX01	HH2SE1Acct#	HH2SE1Val	HH2SE1Bal	HH2SE1Pmt
							HH3-PSX01	HH3SE1Acct#	HH3SE1Val	HH3SE1Bal	HH3SE1Pmt
							HH4-PSX01	HH4SE1Acct#	HH4SE1Val	HH4SE1Bal	HH4SE1Pmt
							HH5-PSX01	HH5SE1Acct#	HH5SE1Val	HH5SE1Bal	HH5SE1Pmt
							HH6-PSX01	HH6SE1Acct#	HH6SE1Val	HH6SE1Bal	HH6SE1Pmt
							HH7-PSX01	HH7SE1Acct#	HH7SE1Val	HH7SE1Bal	HH7SE1Pmt
SE-PSX02											
SE-PSX03											
SE-PSXnn											

463, 464, 465

Figure 4A.1-1: Illustrative Database Models: HH View, SE View

Financial Institutions

Personal Settlements Exchange

Service Establishments

From Figure 4A

Return point

Analyze HH historical payment pattern for each SE and FIN relationship — *S02*

Fig. 4B.1

Compute HH . SE Payment Risk Factors — *S03*

S01

Compute normalized Payment Risk Factors — *S04*

Compute SE-specific proforma periodic payments for each HH — *S05*

Consolidate HH-specific proforma periodic payment amount — *S06*

Fig. 4B.2

Compute SE-specific aggregate proforma periodic payment from all HHs — *S07*

S08

Download SE-specific data to SEs:
-HH proforma periodic payments
-Aggregate HH periodic payment — *S09*

Download FIN-specific data to FINs:
-HH proforma periodic debit data
-Aggregate SE payment data — *S11*

Upload and store — *S10*

Upload and store — *S12*

To Figure 4C

Figure 4B: Analysis of Risk and Computation of Proforma Payments

Figure 4B.1: Computation of Payment Risk Factors

1

| To compute HH-specific Payment Risk Factors for each SE relationship | (From Fig. 4B →) — 503 | 550 |

| Collect 12-month data by HH re: SE(j)(i)V, SE(j)(i)$, HH(i)(j)$ | SE(j)(i)V = Volume of services provided by SE(j) to HH(i) SE(j)(i)$ = Actual billable value of SE services in period t HH(i)(j)$ = Amount paid by HH(i) during period t | 551 |

| Evaluate monthly payment variance | $Var(i)(j)\$ = SE(j)(i)\$ - HH(i)(j)\$$ | 552 |

| Evaluate monthly timing variance | $Var(i)(j)T = SE(j)(i)T - HH(i)(j)T$ | 553 |

| Compute interest on projected Var | $Int\% = f[Var(i)(j)\$, Var(i)(j)T, mkt\ risk\ rate\ \%]$ | 554 |

| Compute Payment Risk Factor PRF(i)(j) for each HH(i) payment to SE(j) | $PRF(i)(j) = f[Var(i)(j)\$, Var(i)(j)T, Int\%]$ $= g[HH(i)(j)\$/SE(j)(i)\$, Int\%]$ | 555 |

| If PRF(i) > i* = risk ceiling, go to Exception Management System | | 563 |

| Repeat for all SE's (j) serving HH(i) | index by j for j = j+1 | 556 |

| Repeat for all HH(i) | index by i for i = i+1 | 557 |

2

| To compute SE-specific Payment Risk Factors for all HH relationships | (From Fig. 4B) — 503 | 558 |

| Compute for each SE(j), across all HH: · Value & range of Payment Variance; | $Var(j)\$ = SE(j)\$ - HH(j)\$$ | 559 |

| Compute for each SE(j), across all HH: · Duration & frequency of Timing Variance | $Var(j)T = SE(j)T - HH(j)T$ | 560 |

| Compute aggregate PRF(j) for each SE(j) reflecting payment and timing variances from all HH | $PRF(j) = f[Var(j)\$, Var(j)T, Int\%]$ $= g[HH(j)\$/SE(j)\$, Int\%]$ | 561 |

| Repeat for all SE(j) | index by j for j = j+1 | 562 |

3

| To compute Normalized Payment Risk Factors for all HH relationships by SE | 504 | 563 | (From Fig. 4B) 504 |

| Normalize Household PRF(i)(j) to total PF(j) of SE for large population risk amortization | $NPRF(i)(j) = w[HH(i)(j)\$/SE(i)(j)\$, HH(j)/SE(j)\$, Int\%]$ |

To Figure 4B and 4B.2

*Figure 4B.2 :   Computation of Proforma Household Payments
to Service Establishments*

From Figure 4B and 4B.1

570

To compute HH-specific Consolidated
Periodic Payment Amount   (From Fig.4B) *506*

571

| Retrieve historical billings | $SE(j)(i)\$ \text{ for all } HH(i)$ |

572

| Compute initial Periodic Payment Amount by HH(i) to SE(j)(i) | $SE(j)(i)\$H = f[HistSE(i)(j)\$]$ |

573

| Retrieve Normalized Payment Risk Factor PRF(i)(j) | $NPRF(i)(j) = w[HH(i)(j)\$/SE(i)(j)\$, HH(j)/SE(j)\$, Int\%]$ |

574

| Compute Proforma Periodic Payment Amount of HH(i) to SE(i)(j)\$ | $SE(i)(j)\$R = r[NPRF(i)(j), HistSE(i)(j)]$ |

(Yields single, constant payment amount, unique to each HH, for paying a singular SE(j))

| Repeat for all SE's (j) serving HH(i) | index by j for j = j+1 | *575*

576

| Compute Consolidated Proforma Periodic Payment amount SE(i)C\$ for all SE(j) serving HH(i) | $SE(i)\$C = Sum [SE(j)(i)\$R \text{ over all } j \text{ serving } HH(i)]$ |

(Yields constant consolidated payment amount, unique to each HH, for paying a plurality of SEs serving household)

| Repeat for all HH(i) | index by i for i = i+1 | *577*

To compute SE-specific Aggregate Periodic
Payment amount: (From Fig.4B) *508*

578

579

| Compute Aggregate Proforma Periodic payment from each household HH(i) to specific SE(j), over all HH(i) being served by SE(j) | $SE(j)\$A = Sum\ SE(j)(i)\$R \text{ over all } i \text{ served by } SE(j)$ |

(Yields constant aggregate periodic payment amount, unique to each SE, for settling obligations due from all HH served by the SE)

| Repeat for all SE(j) | index by j for j = j+1 |

580

To Figure 4B . Step _

Figure 4C: System Payment Cycle

Figure 4C.1: Proces. *.g of SE Service and Billing* *.ta*

~630

To Process SE service and billing data for each HH and SE → (From Fig.4C)

Authenticate SE transmission data and verify SE-PSX# — 631

Perform 2-way match: (1) HH-PSX# from SE to PSX HH# on record. (2) HH-SE account number from SE to same in PSX-HH records. — 632

Update SE and HH datafiles for current cycle — (Fig. 4C.1-1)
633

Test payment tolerance and read file codes — 634

635 — Special handling? —Yes→ 636 — New special? —Yes→ 637 — Attach/revise handling code

Special handling? No

New special? No

Retrieve filing handling directives by code data and append to file for specific handling and tracking — 638

Handling Directives encompass:
- Promotional adjustments
- Rebates
- Interest charges
- Alternate payment arrangements
- Other handling not due to failed payments

Retrieve HH payment file, and compile: prior payment cycle status, current cycle consumption, and proforma or special payment — 639

Compute consolidated HH debit per file handling directives and file specifcs — 640

Extract and store in statement compiler for printing or electronic transmission/display — 641

Repeat for all HH(i) served by given SE(j)(i) — 642

Repeat for all SEs in System — 643

To Fig. 4C. Step___ — 644

Figure 4C.2: Exception Management System

From Figure 4C · Step ____ → 650

Exception Event → 651

System Event Code Table → 652

System Event Code Table	R1	R2	R3	R4	R5
E1 Partial Payment	x				x
E2 Zero Payment		x	x		x
E3 Payment Risk Factor > p% risk			x		
E4 Notified payment change				x	x
E5 Technical Payment Failure		x			
EE Other Events/Codes			x		x

System Rules Table → 653

System Procedures Table → 654

P-1	Retrieve HH(i) data record Search for Event history Evaluate risk classification Identify payment alternatives Denote severity code for present action Accept/Reject for further Response → If reject, notify SE(i)(i) and FIN(f)(i)(i)
P-2	If Accept, identify Options for Response Select Criterion for Response selection → Minimize system risk, or → Maximize payment, or → Maximize speed of settlement, or → Minimize HH interest expense Select timing window for resolution → Immediate, or → Prior to next payment cycle, or → Longer-term settlement
P-3	Select Event Response → Enable → Execute
P-4	Notify SE(i)(i), FIN(f)(i)(i)
P-5	Assign Special Tracking Code

Event Response Table → 655

A-1	Increase Retry Number Set Retry parameter
A-2	Debit Alternate Payment Source Identify alternate sources Initiate alternate debit Recompute proforma payment
A-3	Allow Partial Payment Set minimum partial amount → Initiate partial pmt process Recompute proforma payment
A-4	Reschedule Payments Set time extension period → Initiate reschedule process Recompute proforma payment
A-5	Contact Customer Additional information? Confirm action Set start date Notify SE re action

Update System Database → 656

Return → 661

(Fig 4C 2.1)

(Fig 4C 2.2)

Figure 4C.2-1: Partial Pa, ient Processing Method
[Exception Management System Detail]

From Figure 4C.2 - Event Response Table

670

Retreive HH File Record

671

Identify Established Payment
Priorities from Subscription Form

672

Priorities
Stated?   No

Yes   673   674

Use Subscription   Use System
Priorities   Default Priorities

675

Apply minimum partial
payment to first priority
payment SE

676

Remainder
>$0?   No

Yes   677

Apply remainder of
partial payment to
next priority SE

678

Send Payment
Instruction to FIN(i)(j)

679

Return to Procedures Table in
Exception Management System

To Fig. 4C.2 Procedure P-4

Figure 4C.2-2: Reschedu...d Payment Processing Metl... J
[Exception Management System Detail]

From Figure 4C.2 - Event Response Table

Retrieve HH File Record — *680*

Access online resources and update HH file — *681*

Compute HH recurrent disposable cash vs current proforma payments — *682*

683

Deficit? — Yes → Contact subscriber re: restructure/refinance household obligations — *684*

No

Evaluate current payment amounts for currency — *685*

686

Past dues >1 period?

Yes → Accumulate all past due and unpaid current period amounts — *687*

No → Reschedule current proforma amounts — *688*

Select single or combined approach based on settlement criterion in Procedures Table — *689*

Options

Spread Past Due Amount	Defer Past Due Amount
640	*691*

Options

Extend Current Amount	Defer Current Amount
692	*693*

Set duration of rescheduling program elements — *694*

Recompute Proforma Payment amount and Payment Risk Factor — *695*

Send Payment Instruction to FIN(i)(j) — *696*

Return to Procedures Table in Exception Management System — *697*

To Fig. 4C.2 Procedure P-4

Figure 4D: Payment Reserve Analysis and System Credit Enhancement

Figure 4D.1: Liquidity Support and Credit Enhancement Detail

From Fig. 4D

750

To backstop liquidity and enhance creditworthiness of the Exchange

751

Analyze historical arrears status and write-offs on HH payments to SEs

752

Model loss profile and set projected losses and cost of delayed payments

753

Establish first-loss provision for funding projected shortfalls to SE aggregate payment obligations

754

Further fund reserve account via revolving credit facility and/or insurance fund to targeted support level
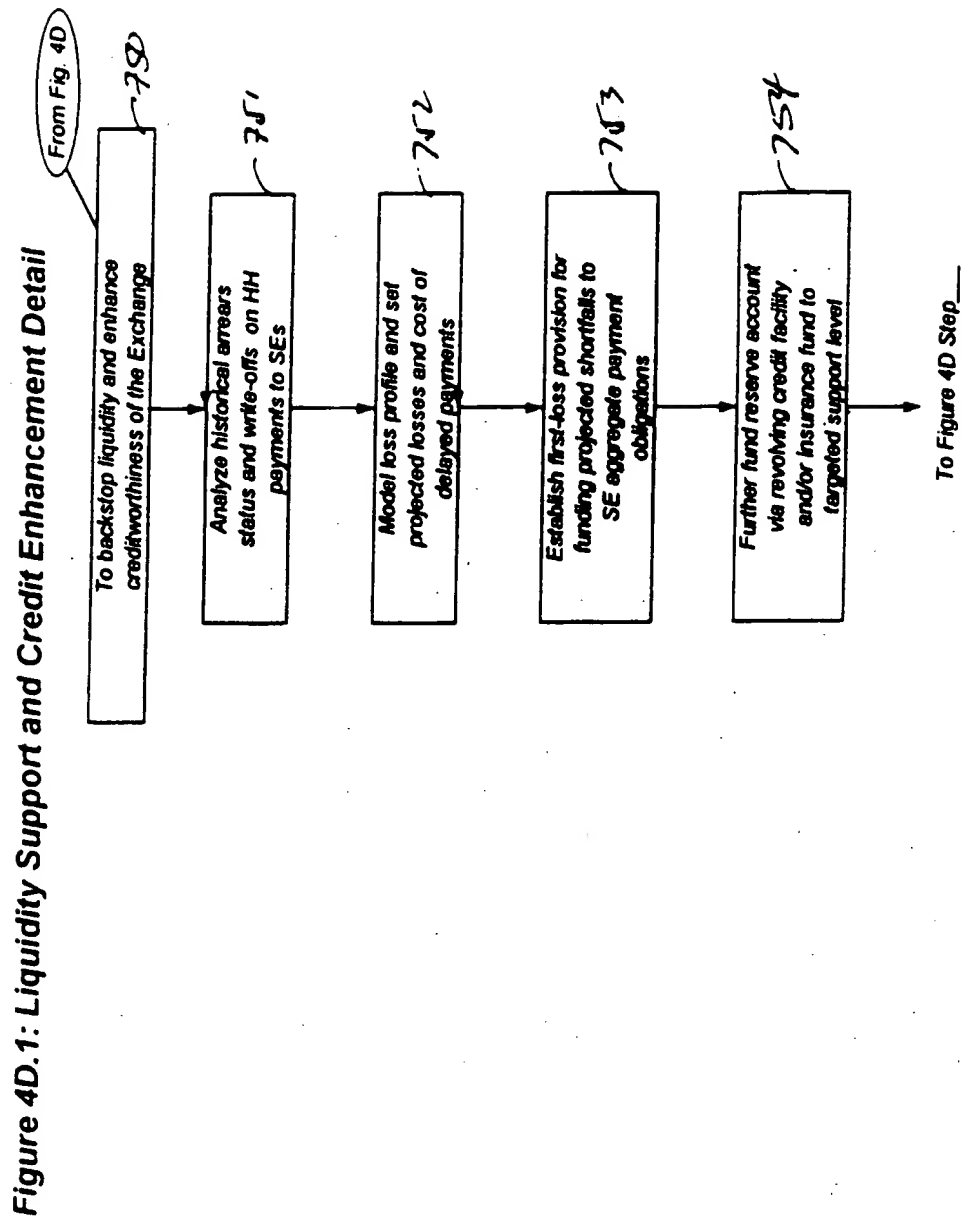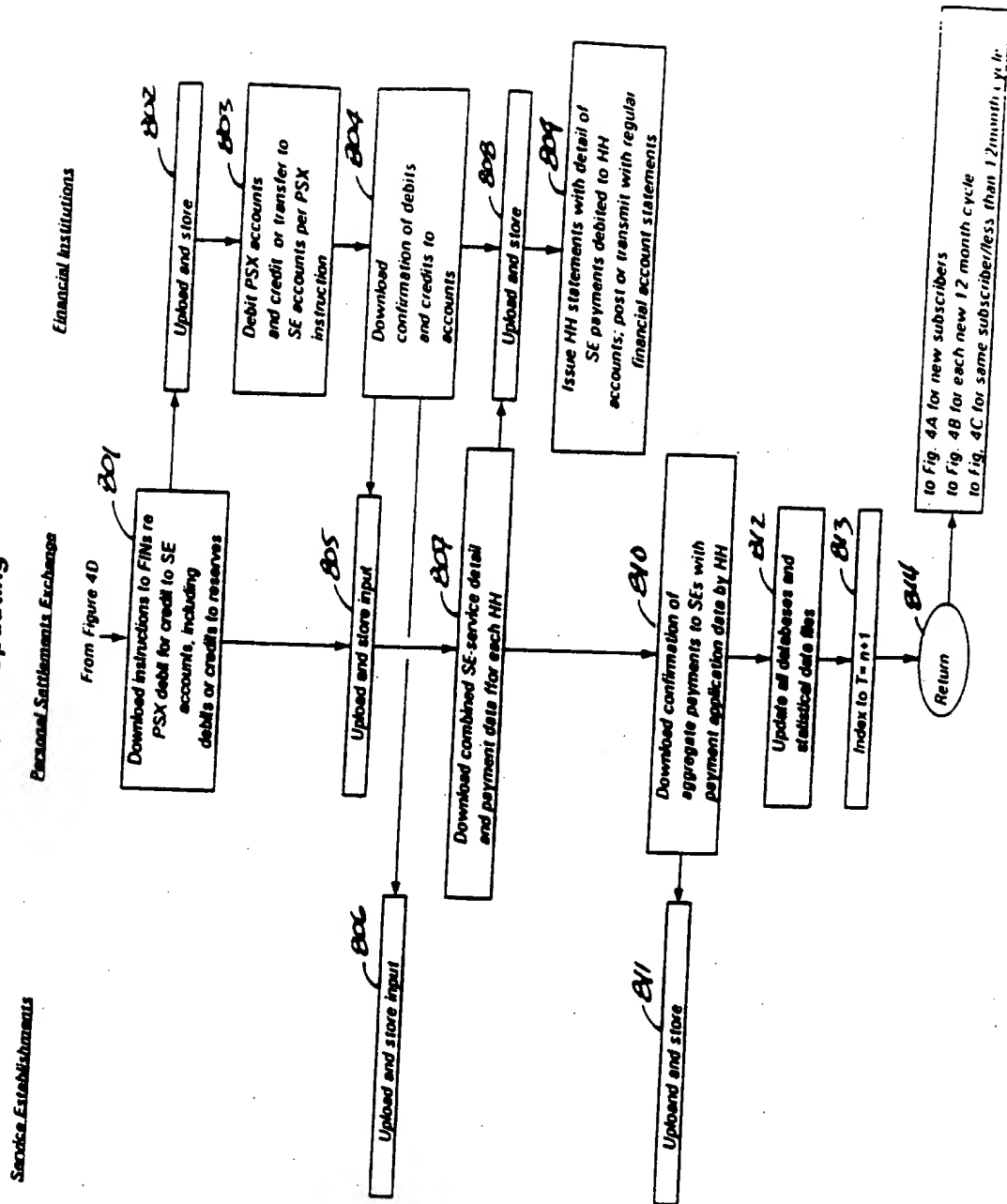
To Figure 4D Step___

Figure 4E: Settlement, Notification, and Updating

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/24945

A.   CLASSIFICATION OF SUBJECT MATTER

IPC(6)   :G06F 17/60
US CL   :705/40

According to International Patent Classification (IPC) or to both national classification and IPC

B.   FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. :   705/40

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C.   DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	US 5,832,460 A [BEDNAR et al] 03 November 1998	1-34

☐   Further documents are listed in the continuation of Box C.   ☐   See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier document published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 JANUARY 1999	**11 MAR 1999**

Name and mailing address of the ISA/US	Authorized officer
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